Journal of Forensic and Legal Medicine 16 (2009) 182–188

Contents lists available at ScienceDirect

Journal of Forensic and Legal Medicine

journal homepage: www.elsevier.com/jflm

Original Communication

Characteristics of victims and assaults of sexual violence – Improving inquiries and prevention

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ARTICLE INFO

Article history:
Received 5 December 2007
Received in revised form 6 June 2008
Accepted 8 July 2008
Available online 21 October 2008

Keywords:
Sexual assault
Epidemiology
Prevention
Multidisciplinary public centre

ABSTRACT

The purpose of our study was to provide descriptive data on victim and assault characteristics in sexual violence and to ascertain risk factors in the sequence of the assault events. Retrospective data were collected on all sexual assault victims presented to the sexual referral centre, the police and the Institute of Forensic Medicine in Aarhus, Denmark, during a five-year period. Four hundred and twenty-three victims were included. The annual incidence rate was 14.5 per 100,000 inhabitants aged 12–87 years and the "dark figure" was estimated to be 1.34. Median age was 21 years; 69% of the victims knew the assailant, and penile intercourse was reported in 59% of the cases. Young age and drinking alcohol were risk factors for the assault to take place in a public place. Information to high-risk groups identified by this study should be integrated in approaches of modifying sexual behaviour. Furthermore, the results from this study are useful in supporting staff and police investigators in the guidance of their efforts regarding treatment and inquiries.

1. Introduction

Knowledge of the extent of sexual violence in Denmark as well as internationally has so far been based on police statistics of reported cases of sexual assault or on population surveys. The Danish police statistics have revealed the number of reported rapes/attempted rapes as rather constant during the last decade with around 500 cases a year (annual incidence rate 9.1 per 100,000 people >12 years (average in 2000–2004)).[1] Danish studies during 1975 and 2001 have dealt with the characteristics of the victims and of the assaults, some studies covering rapes/attempted rapes reported to the police and medically examined, others with notification but without a medical examination, or medically examined victims but not police-reported.[2–8] Due to these differences in selection of study population assaults by strangers varied from 23% to 40%, physical coercion from 56% to 80%, and subjected to penile penetration (completed intercourse) from 57% to 78%. Genital and extra-genital injuries were reported as making up to 32% and 69% of the cases, respectively.

During recent years, the medical examination has taken place at one of several Danish sexual referral centres. The Western Danish Sexual Assault Center (WeDSAC) was established in Aarhus in November 1999 as the first multidisciplinary public centre for adolescent and adult victims of sexual assault in Denmark.[9] The centre runs a 24-hour service, offers professional medical and psychological treatment as well as forensic evidence collection and documentation. No referral is needed to attend the centre, nor is police notification.

The other Nordic countries established multidisciplinary public centres for victims of sexual assault earlier than Denmark, and the UK, the US, and Canada also have a long tradition in treating victims of sexual assault following specific protocols.[10–17] Reported descriptive data on the victims and the assaults are, for the main part, at the Danish level[18–26] except peaks at 67% strange assailants,[17] 90% exposed to physical coercion,[14] 92% completed intercourses,[27] genital lesions in 68%,[28] and body lesions up to 89% of the cases.[29]

Only few studies have reported annual incidences and they have been very diverse because of various definitions of sexual violence, different year of study, different settings, and different inclusion criteria. Nesvold and Nordic colleagues found annual incidences in Helsinki of 21 per 100,000 females >12 years, 60 in Oslo, and 110 in Reykjavik.[30] Magid et al. estimated the annual incidence rate to be 185 per 100,000 females >14 years (Colorado, US),[31] and in a recent study Saltzman et al. (US) reported a rate of

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doi:10.1016/j.jflm.2008.07.004

25 per 100,000 inhabitants (i.e. both sexes and all ages).[32] None of these three incidence studies concerned assaults taking place only inside a specific geographic area.

The cited studies used various definitions of the sexual act. The terms rape, attempted rape, sexual assault, touching sexual parts, and sexual intercourse have all been used. Depending on the institution one represents, i.e. legal, criminal, medical, forensic, or psychological, sexual assault has a smaller or wider meaning. As a result this causes a variation in annual incidences and differences in characteristics of victims and assaults. It is very important to distinguish between the terms rape and sexual assault. Rape should be considered as a non-medical concept restricted for use by the legal system only, and sexual assault has an even more ambiguous set of meanings like the one WHO uses to define sexual violence.[33]

In this study the terms "sexual assault" and "sexual violence" cover episodes of involuntary interpersonal hetero- as well as homosexual acts/contacts, such as accomplished or attempt to accomplish penile penetration or use of objects in the vagina, anus, or mouth, irrespective of ejaculation of semen or not, and episodes in which a person is believed, or consider him/herself to be assaulted.

It is well known that not all cases of sexual assault are notified to the police, leaving a "dark figure" of sexual violence.[34] Now, because of the existence of several multidisciplinary public centres for sexual assaults, contribution to the epidemiology of victims and circumstances of sexual assaults has obtained another and more advanced implementation. This provides the opportunity to get a better estimate of the extent of sexual violence not known by the police.

Research lacks newer studies with larger sample sizes and studies challenging the indistinct pictures of characteristics and incidences of sexual assaults due to various definitions and diversities in settings. Furthermore, studies concerned with risk factors of sexual violence are very rare,[35] but studies of interpersonal violence show that assaults by strangers imply more severe violence, and that young people are more often assaulted in public places.[36–38] We speculate that this is also true for victims of sexual violence. Our experience and supposition from daily work is in contrast to the public/media opinion that stranger assaults are completed rapes. A greater insight into sexual violence epidemiology is desirable in order to take care of the victims and provide preventive innovations.

This study has three primary aims. The first is to estimate a more precise incidence of sexual violence and to approach the "dark figure" not notified to the police. The second is to give a thorough description of adolescent/adult sexual violence in a geographically well-defined area with focus on the victim's demographics, the circumstances of the assault, and some of the medical findings at the forensic examination. The third is to elucidate risk factors in the sequence of assault events by testing three hypotheses: (1) knowing the perpetrator forces completeness of the intercourse, (2) not knowing the assailant leads to more physical violence, and (3) young people are assaulted in public.

2. Materials and methods

The study was performed as a retrospective descriptive single-sample survey.

In a well-defined geographical area cases of sexual assault were identified in a five-year period from November 1, 1999 to December 31, 2004, in the files of three data sources: (a) the WeDSAC, (b) the Institute of Forensic Medicine at Aarhus University (IFM), and (c) the police departments. The area contains the second largest city in Denmark and had during the study period an average of 645,000 inhabitants (539,000 people between 12 and 87 years). This equates to 1/8 of Denmark's population.

Information from the victims undergoing a medical examination at WeDSAC (police reported or not) was listed in a standardised registration form and fed into a database. Genital lesions were identified by macroscopic visualisation during the gynaecological examination, and colposcopy was occasionally used. Information from victims seen by the psychologists at WeDSAC was identified in the psychologists' records. Cases notified to the police were identified in their files.

Victims medically examined, victims only seeing the psychologist with or without police notification and cases from the police were eligible for the study. Cases arising outside the County of Aarhus were excluded along with repeat victims and known false reports/allegations. A report was considered false if the victim later admitted he/she notified wrongly about the assault setting, the assailant, or the content, or if the police pressed charges for false report or accusation.

Information included in this study was sociodemographics of the victim, circumstances of the assault (place of assault, type of assault, ejaculation, coercion, victim's relationship to the assailant, and alcohol consumption), and some of the findings at the medical examination (delay assault-examination, bodily and genital injuries, and alcohol-intoxication by clinical observation). Physical coercion could be mild (restrained), moderate (blow, kick, and bite), or severe (weapons or strangulation). The type of sexual act was categorised as "complete" in cases of vaginal, anal and/or mouth penetration. The relationship to the assailant was differentiated into five levels: partner (victim and assailant know one another sexually, e.g. present or ex-husband/boyfriend), family (assailant is a relative), acquaintance (knowing one another but not having a sexual relationship previously), contact/date (victim and assailant have only just met, typically less than 24 h before the alleged assault, hence have not had a sexual relationship previously) – all classified as victim knowing the perpetrator, and stranger (victim and assailant have not previously seen one another). Bodily and genital injuries were redness, bruising, abrasion, swellings, lacerations, and fractures. Alcohol-intoxication was the medical doctors' subjective judgement of relevant clinical signs as smell on breath, speaking, and walking in order to standardised protocol guidelines. Self-reported alcohol consumption prior to the assault and the clinically judged intoxication were fused in the regression analyses to obtain a complete estimate.

Permission to go through police reports was obtained from The Danish Ministry of Justice. The Danish Data Protection Agency allowed the collection of data.

Analyses and statistical calculations were made using STATA 8.2. Tests applied for categorical data were χ^2_{test}, χ^2_{trend} and statistical significance was assumed if $P < 0.05$. Prevalence proportion ratio (PPR) was calculated, and multivariate logistic regression analysis was used to adjust ORs and 95% confidence intervals (95% CI) for confounding. Variables thought to have clinical or theoretical importance for the outcome were entered into the model regardless of significance.

Interaction terms like effect measure modification were examined in the published model.

3. Results

3.1. Incidence and data source

A total of 579 cases of sexual assault were identified in one or more of the three data sources: WeDSAC, IFM, or police. Thirty-one cases were either charged by the police or admitted by the victim to be false allegations and thus excluded along with 125 cases from outside Aarhus County. This gives 423 cases of sexual violence in the region around the town of Aarhus among 404 different persons (17 victims attended twice and one victim three times).

Table 1
Number and incidence of sexual assault in Aarhus and data source distribution in the study period

Year	Numbers	Incidence[a]	Data source		
			Medical examiner (%)	Police (%)	Psychologist (%)
1999/2000	81	12.9	53	72	56
2001	83	14.6	58	58	57
2002	83	15.4	57	76	67
2003	96	17.5	60	67	65
2004	80	14.7	59	56	70
Study period	423	14.5	57	66	63
χ^2_{test}			$P = 0.93$	$P = 0.03$	$P = 0.25$
χ^2_{trend}			$P = 0.45$	$P = 0.21$	$P = 0.04$
Median age (range)			24 (12–87)	21 (12–87)	19 (13–54)

[a] Annual rate per 100,000 inhabitants aged 12–87 years after removal of repeat victims in the study period.

Table 1 shows the number of victims and the registered incidences, which peaked in 2003. The average annual incidence rate during the study period was determined to 14.5 per 100,000 inhabitants aged 12–87 years. A significant (χ^2_{trend}) increase in psychology treatment of all registered assaults during the years was observed alongside a significant (χ^2) decrease in police reporting from 2000 to 2004, but the frequency of police reporting increased from 2001 to 2003.

Thirty percent of the victims appear in all three data sources, whereas only the psychologists or the police saw 22% and 15%, respectively. Contributing to the "dark figure" was the finding that as many as 34% of the victims of sexual assault in the study population were registered only at the WeDSAC and were not seen by the police.

3.2. Characteristics of the victims

Nearly all (97%) victims were females and only 17 victims were males. The mean age of the whole group was 25 and the median age was 21 years (range 12–87). In Table 2, 14% are children (12–14 years) and 49% are in the young age group (15–24 years), both groups being heavily over-represented in relation to the age distribution in the general population of Greater Aarhus.

3.3. Characteristics of the assaults

The assaults were distributed nearly equally throughout the year, with a small peak in the summer time (August and September) and the lowest frequency during winter (March) with significantly fewer assaults outdoors. No pattern was seen regarding the time of month (around payday). Day of week analysis showed a heavy concentration at week-ends (65%).

Regarding the type of assault, completed sexual assault happened in 59% of the cases with vaginal penetration as the most frequent (87%), oral (26%), and anal penetration (12%). The victim reported ejaculation by the perpetrator in 36%. When the victim and assailant knew each other, completed assault was seen in 70%, but in case of strangers only in 35%. As seen in Table 3 the assailant was a stranger in 31% of the cases. Table 3 further shows details of four situational determinants. Penetration into the mouth was significantly more often seen in the other relationships than if the assailant was a stranger. Both partner/family, acquaintance, and contact relationships showed a significant occurrence of reported assailant ejaculation in contrast to strangers (χ^2_{trend}: $P < 0.0001$).

Use of coercion is given in Table 4 and was seen in 73% of the cases, and severe coercion made up the 13%. Use of physical coercion was significantly (χ^2_{trend}) more often identified in partner and stranger relationships, whereas acquaintances used less violent coercion. Use of weapons and/or strangulation (severe coercion), was seen in 66% of cases with a perpetrator known to the victim.

Table 2
Gender, age, and sociodemographic data of victims of sexual assault in comparison to the general population of Greater Aarhus

	Study population ($n = 423$)		Greater Aarhus[b] (%)
	Numbers	%	
Gender			
Male	13	3	
Female	410	97	
Age			
Median age males	15; range 13–25 years		
Median age females	21; range 12–87 years		
Age group (years)			
12–14	59	14	4
15–17	84	20	4
18–24	122	29	11
25–35	77	18	20
36–87	81	19	61
Occupation[a]			
Employed	73	21	62
Unemployed	46	14	3
Education	187	54	10
Retiree	33	10	20
Other	3	1	5
Ethnicity			
Denmark	358	85	93
Rest of Scandinavia	14	3	0.5
Rest of Europe	14	3	2
Middle East	18	4	2
Africa	6	1.5	1
Asia	10	2	1
North/South America	3	0.5	0.5
Type of dwelling[a]			
Alone	98	26	
Alone with kids	32	8	
With partner	44	12	
By parents	120	32	
With others	44	12	
At an institution	28	7	
Place of education	13	3	

[a] 81 missing in occupation and 44 missing in dwelling.
[b] From Statistics Denmark, average 2000–2004, people at risk (12–87 years) only.

3.4. Medical findings[d]

To have evidence and documentation collected, it is necessary that the victim shows up for a forensic medical examination. Fifty-two percent came within 12 h, another 18% came within 12–24 h postassault, and within 48 h 85% had shown up.

[d] The following results are based on medically examined victims at the WeDSAC or IFM and consist 242 victims supplemented with six police-only cases concerning injuries. With regard to alcohol toxicology, only the examined and those in whom a report was filled are enrolled ($n = 189$).

Table 3
Place of assault and victim-assailant relationship in cases of sexual assault by completed assault, way of penetration, and ejaculation ($N = 423$)

Determinant	Study population		Penile intercourse										Ejaculation		
			No	Yes									%	PPR	95% CI
				Vaginal			Oral			Anal					
	N	%	%	%	PPR	95% CI	%	PPR	95% CI	%	PPR	95% CI			
Place of assault															
Private					1.8	1.4–2.3		2.1	1.2–3.9		1.6	0.7–6.6		2.6	1.7–3.9
Victim's home	99	25	31	59			15			13			51		
Assailant's home	75	19	25	65			29			7			47		
Other home	55	14	30	67			13			7			46		
Public indoor					1.8	1.3–2.5		3.9	1.9–8.3		1.5	0.3–6.6		1.1	0.4–2.9
Pub	14	4	57	43			21			7			18		
Place of education	7	2	33	33			40			20			0		
Work	3	1	0	67			33			0			2		
Public outdoor					1			1			1			1	
Street/backyard	78	19	71	23			6			7			16		
Park/forest/beach	59	14	50	47			12			6			28		
Other (e.g. car)	11	3	40	67			20			0			29		
Total[a]	401	101													
Relationship															
Partner	60	15	29	59	1.9	1.4–2.6	19	3.0	1.2–7.8	12	2.0	0.7–5.5	67	3.3	2.1–5.1
Family	12	3	18	82	[b]		0	[b]		0	[b]		67	[b]	
Acquaintance	121	30	32	57	1.7	1.2–2.3	24	4.5	1.9–10.1	10	1.9	0.7–4.9	33	1.6	1.0–2.7
Contact	85	21	31	62	1.8	1.4–2.5	20	3.7	1.5–9.1	8	1.5	0.5–4.4	27	1.8	1.0–3.1
Stranger	125	31	65	33	1		5	1		5	1		21	1	
Total[a]	403	100													

Note: Columns equals population number and 100% for study population. Row for intercourse and ejaculation does not equal 100% because vaginal, oral, and anal intercourse could happen during the same assault.
[a] 22 missing in place of assault and 20 missing in Relationship to assailant when Study population. 48–68 missing when Penile intercourse. 167 missing when Ejaculation.
[b] Family relationship is included in Partner when PPR estimate.

Table 4
Verbal threats or physical coercion during the assault by relationship (in case of medical examination or police reporting)

Used coercion	Total		Partner		Family		Acquaintance		Contact		Stranger	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
None	80	27	9	18	4	40	30	38	19	32	18	17
Threats	6	2	1	2	0	0	2	3	3	5	0	0
Mild	148	49	23	47	3	30	37	48	28	47	57	55
Moderate	29	10	7	14	0	0	1	1	5	8	16	15
Severe	38	13	9	18	3	30	8	10	5	8	13	13
Total	301	101	49	99	10	100	78	100	60	100	104	100
χ^2_{test} [a]			$P = 0.12$		$P = 0.47$		$P = 0.004$		$P = 0.24$		$P = 0.006$	
χ^2_{trend} [a]			$P = 0.046$		$P = 0.87$		$P = 0.0008$		$P = 0.09$		$P = 0.003$	

30 cases missing.
[a] Test on 2×3 tables with coercion classified in none/threats, mild and moderate/severe groups.

The forensic medical examination (and police inspection) revealed injuries in 73% of the victims; 53% suffered skin or bone injury, 19% both extra-genital and genital lesions (interfemoral, anogenital, vaginal and anal) and 1% genital damage alone. Sixty-three percent of the victims with body injuries had one to three lesions.

The self-reported alcohol intake prior to the assault revealed 43% of the victims had drunk more than one unit (i.e. 0.2 pro mille). According to the above-mentioned time delay and interpreting the clinical rating for alcohol intoxication, 80% of the victims examined no later than 12 h after the assault were estimated as not being under the influence of alcohol.

3.5. Risk of different assault outcome

The multivariate analysis in Table 5 compares characteristics of the victims and of the assault and medical findings. The youngest age groups (<24 years) were significantly more often assaulted in a public place, and drinking of alcohol increased the risk of public place assault. Furthermore, victims assaulted in public had a significant risk of being exposed to physical coercion. Exploring the correlation between physical coercion, place of assault, and alcohol showed alcohol not was associated, though. Instead, age was identified as introducing confounding but otherwise not effect measure modification. In case the victim knew the perpetrator, the risk of complete sexual assault increased three times compared to a stranger (OR 2.9, 95% CI: 1.35–6.28).

4. Discussion

4.1. Main findings

We focused on characteristics of victims and settings and risk factors in sexual victimisation as well as on estimating the "dark

Table 5
Multivariate logistic regression analysis showing the association (odds ratios – OR) between victim and assault characteristics of sexual violence along with the medical findings of genital lesions

Determinants	Public place of assault (n = 223)		Victim knowing the perpetrator (n = 221)		Victim exposed to physical coercion (n = 214)		Complete sexual assault (n = 205)		Genital lesion (n = 205)	
	%	Adjusted OR (95% CI)	%	Adjusted OR (95% CI)	%	Adjusted OR (95% CI)	%	Adjusted OR (95% CI)	%	Adjusted OR (95% CI)
Age										
12–14	11	4.15 (1.50–11.5)	4	15.5 (2.74–87.2)	8	0.14 (0.05–0.44)	13	1.04 (0.28–3.84)	15	0.92 (0.24–3.50)
15–17	13	3.40 (1.33–8.70)	19	1.24 (0.42–3.70)	14	0.40 (0.15–1.05)	18	1.97 (0.59–6.51)	21	1.21 (0.41–3.61)
18–24	26	2.09 (0.90–4.84)	29	1.21 (0.47–3.11)	27	0.92 (0.39–2.17)	24	0.65 (0.26–1.64)	23	0.95 (0.35–2.55)
25–34	21	1.88 (0.78–4.55)	25	1.20 (0.44–3.25)	25	0.94 (0.38–2.30)	19	0.61 (0.24–1.56)	17	0.64 (0.21–1.93)
35+	29	1	22	1	25	1	26	1	23	1
Alcohol										
None	58	1	47	1	56	1	53	1	55	1
Yes	42	1.84 (1.03–3.31)	53	1.21 (0.59–2.49)	44	0.50 (0.27–0.94)	47	1.52 (0.77–3.03)	45	0.78 (0.38–1.64)
Place of assault										
Private			32	1	60	1	71	1	62	1
Public			68	0.09 (0.04–0.18)	40	3.96 (1.78–8.83)	29	0.49 (0.22–1.11)	38	1.34 (0.57–3.18)
Relationship to perpetrator										
Known					69	1.22 (0.56–2.68)	71	2.92 (1.35–6.28)	74	0.88 (0.36–2.17)
Unknown					31	1	29	1	26	1
Physical coercion										
None							30	1	41	1
Yes							70	1.82 (0.87–3.81)	59	0.60 (0.28–1.31)
Complete										
No									12	1
Yes									88	3.73 (1.31–10.6)

figure" of sexual assault. Thirty-four percent of the victims did not come to attention of the police because they were only registered at the WeDSAC. Only 3% were males. Sixty-three percent were children (12–14 years) or young people (15–24 years), age groups only constituting 19% of the general population and thus being heavily over-represented. The sexual act included vaginal, anal, or oral intercourse in 59% of the cases, and in 69% of the cases the victim and assailant knew each other. Knowing the perpetrator was associated with higher risk of completed assault, whereas the relationship to the perpetrator did not affect the use of violence. Young people had a four times higher risk and alcohol doubled the risk for the assault to happen in a public place.

4.2. Limitations and strengths

Information regarding personal aspects and the alleged assault was given by the victim and could be deficient because of stress, tiredness, or intoxication. As a precaution, however, the police collected the same information later on as well as several times during the investigation of the case, so in this context, we believe that the information is reliable. Unfortunately, misclassification due to false allegation is a risk and could increasingly bias the estimated annual incidence rate. We have excluded known false reports/accusations, but some unfounded cases may still exist and might turn out to be false. To further elucidate this problem a study on false allegation has been launched.

A problem in the study regarding selection of cases is that only registered cases were included. This is a common concern in sexual violence research based on cases known to the police and medical examiner.[35] Taken the resulting underreporting issue into consideration, both the incidence rate and "dark figure" must be underestimated in relation to the "real" number of cases because of selection bias. On the other hand, the WHO definition used has a broader range than in many other studies, hence overestimating the comparable incidence, but it is necessary to get as close as we can to the real figure of sexual violence. Further counteracting the underestimation is the above-mentioned information bias from false allegations, but we believe that this issue does not have any great potential to neutralise the two opposite effects, finally resulting in an underestimation of the "real" incidence.

Another selection which could bias the results is that factors like visible injuries or stranger assailant could promote referral, hence overestimating the occurrence of these factors, maybe at the expense of partner-relationships.[39,40]

Confounding can arise from all determinants used. Variables of particular interest are age and alcohol intake, which in turn could promote certain settings and encounters. Age were found to interact the association between place of assault and alcohol intake but was not subjected to effect measure modification. The above-mentioned problems with the selection overestimating some assault characteristics will not cause association biases, and thus not affect the outcome measures and maintain good intern validity.

This study was designed to accommodate for the "dark figure" because the cases come from different sources and also include pure psychologist cases. The strength of the study set-up can, with regard to the WHO definition, cause trouble in relating the results to other studies, considering the diversity in police filing and medical examination, thus lowering the external validity. This is the price for, what we believe, is the first case series of sexual violence that includes victims not examined medically or reported to the police. Also, the use of multivariate logistic regression analysis is warranted in estimating risk for different assault events and strengthens the outcome. Comparison with earlier studies in this field is always encumbered by precautions due to the various definitions and samples, but is should be possible to generalise the epidemiology revealed in the present study to countries with cultural norms and restrictive weapon legislation similar to Denmark.

4.3. Comparison and interpretation of results

The victim demographics parallel those found by others.[4,25,30] The proportion of males is, however, reported as being higher (10%) in Edinburgh and from emergency departments in the US.[24,32]

The estimated frequency of 58% for private residences as place of assault is reflected elsewhere.[7,14,19] In other studies this is even

more frequent, e.g. in India and Greenland, where 87% and 84% of victims examined at a local forensic institute or by district medical staff were assaulted in privacy.[26,41] The percentage of sexual assault conducted by strangers is also similar to comparable studies,[3,23,34,42] whereas Bang reported 69% were strangers in a study including medically examined victims,[11] McGregor et al., who in two case series of police reported medical examined victims reported 67% and 57%, respectively,[17,22] and Haugen et al., who found that 21% of perpetrators were strangers.[18] The great discrepancy could be because the study by Bang is 20 years old and from the modest beginnings of the Oslo Referral Centre where most cases were police reported, and in the two studies by McGregor from Vancouver, the distinction could be caused by the pure police involvement and otherwise local traditions. Population-based surveys have, however, demonstrated much lower rates of stranger relationships, indicating that assault by strangers promotes police filing.[39,43]

The proportion of cases with penile penetrating assaults in this study confirms results by Schei et al.[6] but is somewhat lower than proportions reported previously.[20,27] These studies either enrolled victims medically examined regardless of police involvement, or only included victims reported by the police, which would tend to increase the number of cases of completed intercourse. Another contribution to the difference could be the victim's need for examination for sexually transmitted diseases, which in Denmark might be obtained more easily elsewhere.

Of great importance in the collection of forensic evidence is the time delay from assault to medical examination, and the fact that victims allowed examination could predict the seriousness of the sexual assault. Our findings of delay are comparable with other studies, albeit at the better end, with 70% of the victims referred within 24 h and distinctly better than the 50% observed by Santos et al.[21] We believe the generally quick referral is mainly due to the existence of excellent police authority co-operation, a teamwork integrated into the daily effort of WeDSAC to bring understanding for and interest in the medical examination.

The diagnosis of genital lesions is consistent with some published data[18,20] but other reports range from 10% to 87%.[7,44–48] Different use of colposcopy, emphasis on prepubertal girls, inclusion of redness/swelling, and differences in involvement of law enforcement can explain this great variation. Slaughter et al., who used colposcopy, reported significantly fewer genital findings after vigorous consenting intercourse;[28] a fact very important for future examination protocols because genital lesions has not yet been proved to be significant for successful legal prosecuting.[15,22,25,44,49]

One of the stated hypotheses – that strangers use more violence to obtain the desirable – was not confirmed, which is in contrast to other studies.[43,50,51] This can be interpreted as meaning that the victims are so frightened that they do not resist or that partners are aggressive as well.[52,53] The other two hypotheses were confirmed as mostly young people were assaulted in public, and knowing the perpetrator caused more completed sexual intercourses. In concordance with Scott and Beaman,[35] assault by strangers could be characterised as an attempt with either a good chance of escape or a hopeless setting was chosen by the perpetrator due to impulsive action. Contrariwise, Ullmann and Siegel found 49% of stranger-rapes completed among an interviewed female population with no emphasis on unfounded allegations, though.[52]

Contrary to Scott and Beaman,[35] but similar to Brecklin and Ullman,[54] we did not find associations between alcohol consumption and reported intercourse completion.

The estimated annual incidence rate is higher than previously reported in other Danish studies,[4,8] but it may be due to the inclusion of psychologist only contacts in the study. Bang introduced the "rape-index" in 1993, and she reported an incidence in Oslo of 37 per 100,000 inhabitants.[10] WeDSAC previously showed incidences for major Nordic cities from 30 to 148 per 100,000 women aged 12–50 years, the larger the city, the smaller the incidence.[9] Most studies, however, rely on lifetime prevalence obtained by public surveys based on phone, questionnaires, or gynaecologic outpatients, ranging from one out of three to one out of 33 women.[40,55–59] This contrasts sharply with the incidences recognised by the police, and accounts at 5% of the "real" incidence has been suggested.[60] Our approach to the "dark figure" is that one out of three victims are not reported to the police. Obviously, the figure is much larger because many victims first show up after several assaults, or, as suggested by the cited surveys, do not show up at all. However, population surveys and the present series could overestimate the "dark figure" of rape by illuminating the complainant's feelings instead of legal judgment; but as mentioned in the beginning, sexual violence has a broad range of meanings depending on the persons asked. We believe the difference between referrals to the WeDSAC and the police reflect a tendency that the victims go to the WeDSAC for help instead of notifying the police, a trend that may increase the "dark figure" of sexual assault further.

5. Conclusion and perspectives

The annual incidence rate has shown only minor changes during the years. Therefore it is important that medical examiners and police keep up to date regarding the information provided by characteristics and hypotheses tested in the present paper.

Risk factors as shown in this study along with the basic characteristics of victims and assault settings (i.e. most victims are school or college girls assaulted by someone they know, often in public and often when intoxicated) should be acknowledged in our efforts to suggest innovative and preventive implementations to sexual assault. From the news media one might easily get an unrealistic picture of victims of sexual assault, because it is not clear that 69% of the complainants had had a relationship to the perpetrator prior to the assault, and 41% of the intercourses were without penile penetration.

It is necessary to move from elusive to exclusive prevention by means of identifying promising practises, starting with how to reach the groups of interest as identified in this study, together with future research in the controversial "dark figure". The results of our study are also important in the public debate as to how politicians and leaders of multidisciplinary public centres should prioritise endeavours.

Conflict of Interest Statement

None declared

Acknowledgments

The authors are grateful to Aarhus Universitetshospitals Forskningsinitiativ, Direktor Jacob Madsen and Hustru Olga Madsens Fond, and The A.P. Moller Foundation for the Advancement of Medical Science, for financial support.

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